

## Correspondence

### Second Letter to the Editor concerning "Total hip arthroplasty for primary osteoarthritis in younger patients in the Finnish arthroplasty register" by Eskelinen et al. and correspondence, Acta Orthop 2005; 76: 28-41, 604-607

Sir—We have read with great interest the comments of Drs. Eskelinen, Remes and Paavolainen on our Letter to the Editor.

Certainly, we agree with our colleagues that the reports by Capello et al. (2003), McLaughlin and Lee (2000), Aldinger et al. (2003) and Jacobsen et al. (2003) contain important information about uncemented hips. However, the authors agree with us that none of these reports have fulfilled the NICE criteria as was originally suggested in their paper.

We can accept the claim of the authors that the report by Kim et al. (2003) meets the NICE criteria; we already wrote in our previous letter that this paper approaches the minimum survival of 10 years, so we have no problem in accepting this as a paper on uncemented hips that meets the NICE criteria. Although there was no aseptic loosening of the components and a relatively low prevalence of osteolysis, the authors reported a high rate of linear wear of the polyethylene liner almost 10 years after surgery. It remains unclear if more revisions for this problem are pending in the coming years.

It was indeed remarkable that the report of McAuley et al. (2004) was not referred to in the original manuscript. Certainly, this report claims a survival rate of the THR of 89% at 10 years, with any reason as endpoint. Indeed, if liner exchange is excluded, the 10-year survival of this uncemented THR is 95%. However, does this remark mean that the Finnish hip register does not consider a reoperation for liner exchange to be a hip revision, as is done in the Swedish and Norwegian hip registers? The report of McAuley et al. is also very important because this report shows us the longest published survival of uncemented hips in patients less than 50 years.

In our previous Letter to the Editor, we mentioned that all the published reports of cemented hip implants that fulfill the NICE criteria had been omitted from the original paper. We therefore have a major problem with the answer of Drs Eskelinen, Remes and Paavolainen on this issue, which suggests that only one report on cemented hips is available which fulfills the NICE criteria (Keener et al. 2003). Studies from hip registers do have a major influence on orthopedic practice, therefore these reports should be of the highest standard, with an adequate overview of the literature. Although we sincerely believe that they have reported this to the best of their knowledge, the truth is somewhat different. We have found at least 8 studies on cemented hips in patients younger than 50 years and all of them have fulfilled the NICE criteria; many of them were already published some time ago (Boeree and Bannister 1993, Joshi et al. 1993, Devitt et al. 1997, Emery et al. 1997, Kobayashi et al. 1997, Sochart et al. 1997a,b, Keener et al. 2003).

Long-term survival data in these reports on cemented hips (with revision for any reason as endpoint) are as follows: 60% after 30 years (Keener et al. 2003), 75% after 20 years (Joshi et al. 1993), again 75% after 20 years (Devitt et al. 1997) and 73% at 20 years (Sochart et al. 1997b). These long-term survival data of cemented hips are clearly superior to the longest report available of uncemented hips (McAuley et al. 2004), which has a survival rate at 15 years of 60% (endpoint: revision for any reason). After 10 years, there was a dramatic increase in liner problems and osteolysis. This problem of high wear of the liner was also reported in the only published study on unce-

mented hips that meets the NICE criteria (Kim et al. 2003).

In general, one should not be too optimistic about the survival of total hip implants, cemented or uncemented, in young patients. If concepts of hip implants inserted in young patients (less than 50 years old) are compared with the same implants in patients older than 70 years, the survival in the younger group is always less favorable. This is also shown by the data of the Norwegian and Swedish hip registers.

Certainly, one way of improving the outcome in younger patients is to choose the right implant. However, choosing the best combinations from the analyses of the Finnish register does not guarantee that young patients in Finland will indeed have the best outcome in future. First, concepts must be clinically proven over a period of at least 10 years, secondly ideal combinations may be less favorable in real clinical practice. In addition, both the Norwegian and Swedish hip registers and the study by McAuley et al. (2004) show that the results of uncemented hips deteriorate between 10 and 15 years after surgery. So, follow-ups even longer than 10 years are needed.

We are not “throwing away the baby with the bathwater”, as suggested. We also conclude that an uncemented stem with a cemented cup might perhaps offer young patients a better outcome. This so-called “reverse hybrid” combination is now popular in Norway. Time will tell us the outcome.

Indeed, we are looking forward with great interest to the analysis of results of THR designs (and combinations) in young patients from the Finnish arthroplasty register.

#### **BW Schreurs and JWM Gardeniers**

*Department of Orthopaedics 800, Radboud University Nijmegen Medical Centre, PB 9101, NL-6500 HB Nijmegen, The Netherlands  
B.Schreurs@orthop.umcn.nl*

*Sir*—We thank Drs. Schreurs and Gardeniers for their interest in our paper.

This topic is certainly important and worth discussing, so we wish to make the following comments.

First, it might be beneficial to remind the readers of *Acta Orthopaedica* about the NICE criteria. Using the most recently available evidence of clinical effectiveness, the best prostheses (using long-term viability as the determinant) demonstrate a revision rate of 10% or less at 10 years. This should be regarded as the current ‘benchmark’ in the selection of prostheses for primary total hip replacement (NICE 2003). It is certainly regrettable that so few published studies on the results of THA in young patients meet the NICE criteria. Studies that do not strictly meet the NICE criteria should not be abandoned, however, as they may contain important information.

Secondly, we would like to remind our colleagues that our study, based on the Finnish Arthroplasty Register, was about primary THA in young patients with primary osteoarthritis. Outcome of THA may be different depending on the pathology of the hip joint, especially in young patients (Joshi et al. 1993, Sochart and Porter 1997a).

Thirdly, we wish to comment on previous reports and the NICE criteria. Our honorable colleagues cited Kim et al. (2003), who reported a series of 80 patients (118 hips) with a mean follow-up of 9.8 years. Although the authors advocated the use of a 22-mm diameter femoral head for the increased rate of linear wear in their series (the average wear rate being 0.12 mm/year), the volumetric wear rate was low (on average 47.19 mm<sup>3</sup> per year) and, consequently, the prevalence of osteolysis was low. Kaplan-Meier survivorship analysis, with revision as the endpoint for failure, revealed a 99% rate of survival of the acetabular and femoral components at 10 years. Thus, it seems—at least to us—unjustified to speculate that revisions on account of wear problems can be expected in the future by Kim and colleagues.

The important study of McAuley et al. (2004) was not cited in our original manuscript. Again, we regret that we did not notice this excellent paper. Our colleagues asked which re-operations were considered to be revisions in the Finnish Arthroplasty Register. This was clearly stated in

Material and Methods: “The endpoint for survival was defined as revision when either one component (including exchange of liner) or the whole implant was removed or exchanged” (Eskelinen et al. 2005).

In the series of Sochart and Porter (1997a), the authors reported the results of cemented THA in 161 patients (226 hips) under 40 years of age. 54 of these patients (66 hips) had primary osteoarthritis (OA), which is similar to the situation with the patients in our study. For the patients with OA, the probability of survival of both of the original components at 10 and 25 years was 86% and 52%, respectively. In their series, the average amount of linear wear was 0.11 mm/year, and for hips that had had a revision it was 0.24 mm/year. The other paper from Sochart and Porter cited by our colleagues deals with cemented THA in patients with ankylosing spondylitis (Sochart and Porter 1997b), the results of which—in our opinion—can hardly be directly compared to our study. The same authors have also published the long-term results of Charnley LFA in patients aged less than 30 years (Sochart and Porter 1998). In that paper, the survival rate of the THR was 89% at 10 years, and 65% at 25 years. What is more, in their series, there was a mean annual wear rate of 0.09 mm in patients with rheumatoid arthritis or ankylosing spondylitis, but of 0.24 mm in patients with degenerative arthrosis (avascular necrosis, posttraumatic or metabolic).

Regarding the study of Kobayashi et al. (1997), the authors did not actually report survival of the total hip at 10 years; instead, survival rates of acetabular and femoral components were reported separately. So, one cannot conclude anything about the NICE criteria from the study of Kobayashi and colleagues. It is notable that when revision surgery performed for any reason was used as the endpoint, the survival rate of sockets in the younger patients was 98.2% at 10 years and 68% at 16 years. Annual wear rates were unfortunately not reported in this study. The authors did state, however, that in 8 of the 16 sockets that developed radiographic loosening in the young patients, rapid polyethylene wear was detected 5–10 years before socket loosening.

Keener and co-workers (2003) reported a 60% survival rate at 30 years for 93 consecutive Charnley THAs. The authors did not, however, report the

10-year survival rate for these patients—either in this paper, or in the previous reports on the same cohort (Sullivan et al. 1994, Callaghan et al. 1998). Thus, it is very difficult to conclude that the paper by Keener and colleagues would fulfill the NICE criteria. In this series, the average amount of linear wear was 0.0928 mm/year, and volumetric wear was 104 mm<sup>3</sup>/year.

Devitt et al. (1997) reported the results of 118 Charnley arthroplasties in patients aged 50 years or younger at the time of surgery. The 10-year survival rate of these hips was not mentioned in the original paper, but inspection of the survival curves shows that it was clearly under 90%. What is more, patients with primary osteoarthritis showed a 64% survival rate at 20 years. Note that acetabular wear averaged 0.14 mm/year in these patients. The only description of uncemented hips fulfilling the NICE criteria reported a wear rate of 0.12 mm/year (Kim et al. 2003).

The report by Emery and colleagues clearly fulfills the NICE criteria (Emery et al. 1997). Wear rates were unfortunately not reported in this paper.

Boeree and Bannister (1993) reported the results of 46 cemented THAs in 34 patients. At a mean follow-up of 12 years, 6 of the 34 original patients had a surviving primary THA, meaning a 90% survival rate at 10 years for this series. Thus, the NICE criteria were fulfilled. The authors mentioned in the discussion that 6 other stems and 5 cups were likely to require revision for aseptic loosening in the near future.

Joshi and co-workers published results of 218 Charnley THAs in 141 patients who were 40 years old or younger at the time of surgery (Joshi et al. 1993). The probability of implant survival for these patients was 93% at 10 years and again, the NICE criteria were fulfilled. For patients with osteoarthritis, survival rate of the THA was about 80% at 10 years (from inspection of the curve; the exact rate was not given), and 51% at 20 years. Is it really justified to claim that the results of cemented implants do not deteriorate after 10 years? The authors concluded that in young patients, cemented THA is a good procedure for those with rheumatoid arthritis—but that the results are much less reliable in those with osteoarthritis. We agree with them.

Schreurs and Gardeniers claimed that the Swedish and Norwegian hip registers would have shown

that all implant concepts have poorer results in young patients. To the best of our knowledge, this kind of information has not been published from Nordic registers. Malchau et al. (2002) reported from the Swedish Arthroplasty Register that in general THRs in younger patients (< 55 years of age) show poorer survival than in older patients. In that study, the results of using different concepts were not compared between age groups. In the cohort of patients who were younger than 55 years at the time of the index operation, there was no significant difference between cemented, uncemented, and hybrid implants, although there was a trend toward superior results for the uncemented and hybrid fixation. In a study from the Norwegian Arthroplasty Register, Havelin and co-workers found that in younger patients (< 60 years of age), the uncemented circumferentially porous or hydroxyapatite- (HA)-coated femoral stems had better survival rates than the cemented ones (Havelin et al. 2000), which is in accordance with our results (Eskelinen et al. 2005). They also found that cemented cups had better survival than uncemented porous-coated cups, mainly because of higher rates of revision from wear and osteolysis in the latter. In our material, there was no difference between press-fit uncemented and all-polyethylene cemented cups, when all cup revisions were taken into account (Eskelinen et al. 2005).

What can we conclude about cemented hip implants in young patients with primary osteoarthritis? First, there has not been a single study about cemented THA in young patients with primary osteoarthritis fulfilling the NICE criteria. To be exact, this is also the case for uncemented implants, as the study by Kim et al. (2003) includes different hip diseases. Secondly, the results of cemented hip implants do deteriorate after 10 years of follow-up in younger patients. Thirdly, cemented cups do have problems, both with wear and aseptic loosening in these patients.

It must be noted that our study was based on the Finnish Arthroplasty Register. Most studies from single centers have a relatively small number of patients, and they often provide readers with results involving single surgeons. Register-based studies provide us with valuable insight into the use of the THA procedure in a certain patient

group, as the number of arthroplasties under study (and surgeons) is usually large. Often, the results of a new implant or method are good in a single-center study—but can these results be generalized to the population level? This is a question to which only a register-based study may give the answer. Even so, we acknowledge that the current register-based study had certain limitations. We were not, for instance, able to report any subjective outcome measurements, e.g. Harris Hip Score or disease-specific quality of life measurements, or to perform radiographic analysis with wear measurements. When studying the results of THAs published in the literature, we should evaluate those based on registers and those reported by single centers from different points of view. Results from these different sources complement each other. Both types of studies will certainly be needed in future evaluations of the results of hip implants.

Our Dutch colleagues conclude that one could use an uncemented stem with a cemented cup, which would provide young patients with better outcomes. Whenever the femoral side is concerned, we absolutely agree. Our study has shown without a doubt that these young patients benefit from a modern uncemented stem (Eskelinen et al. 2005). The problem is really the acetabular side: aseptic loosening with the cemented cups (Eskelinen et al. 2005), wear and osteolysis with the uncemented modular ones (Harris 2003). In our opinion, there are three possible solutions: (1) the “reverse hybrid” concept discussed by our colleagues, (2) uncemented modular cups with improved liner congruence and diminished wear (and/or uncemented cups with molded polyethylene to avoid the back-side wear or loosening/breakage of the liner), and (3) hard-on-hard articulations, which have been widely used recently by orthopedic surgeons in Finland. There is a lack of long-term results with these three concepts. Certainly, only time will tell us the eagerly awaited answer.

Again, we thank our honorable colleagues for their interest in our paper, and for the fruitful discussions about this very important topic.

**Antti Eskelinen<sup>1</sup>, Ville Remes<sup>1</sup> and Pekka Paavolainen<sup>2</sup>**

*Department of Orthopedics and Traumatology,  
<sup>1</sup>Helsinki University Central Hospital, <sup>2</sup>ORTON  
 Orthopedic Hospital, Invalid Foundation, Hel-  
 sinki, Finland  
 antti.eskelinen@finnet.fi*

- Aldinger P R, Thomson M, Mau H, Ewerbeck V, Breusch S J. Cementless Spotorno tapered titanium stems: excellent 10-15 years survival in 141 young patients. *Acta Orthop Scand* 2003; 74: 253-8.
- Boeree N R, Bannister G C. Cemented total hip arthroplasty in patients younger than 50 years of age. Ten- to 18-year results. *Clin Orthop* 1993; (287):153-9.
- Callaghan J J, Forest E E, Olejniczak J P, Goetz D D, Johnston R C. Charnley total hip arthroplasty in patients less than fifty years old. A twenty to twenty-five-year follow-up note. *J Bone Joint Surg (Am)* 1998; 80: 704-14.
- Capello W N, D'Antonio J A, Feinberg J A, Manley M T. Ten-year results with hydroxyapatite-coated total hip femoral components in patients less than 50 years old. *J Bone Joint Surg (Am)* 2003; 85: 885-9.
- Devitt A, O'Sullivan T, Quinlan W. 16- to 25-year follow-up study of cemented arthroplasty of the hip in patients aged 50 years or younger. *J Arthroplasty* 1997; 12: 479-89.
- Emery D F, Clarke H J, Grover M L. Stanmore total hip replacement in younger patients: review of a group of patients under 50 years of age at operation. *J Bone Joint Surg (Br)* 1997; 79: 240-6.
- Eskelinen A, Remes V, Helenius I, Pulkkinen P, Nevalainen J, Paavolainen P. Total hip arthroplasty for primary osteoarthritis in younger patients in the Finnish arthroplasty register. 4,661 primary replacements followed for 0-22 years. *Acta Orthop* 2005; 76: 28-41.
- Harris W H. Results of uncemented cups: a critical appraisal at 15 years. *Clin Orthop* 2003; (417): 121-5.
- Havelin L I, Engesaeter L B, Espehaug B, Furnes O, Lie S A, Vollset S E. The Norwegian Arthroplasty Register: 11 years and 73,000 arthroplasties. *Acta Orthop Scand* 2000; 71: 337-53.
- Jacobsen S, Jensen F K, Poulsen K, Stürup J, Retpen J B. Good performance of a titanium femoral component in cementless hip arthroplasty in younger patients. *Acta Orthop Scand* 2003; 74: 375-9.
- Joshi A B, Porter M L, Trail I A, Hunt L P, Murphy J C, Hardinge K. Long-term results of Charnley low-friction arthroplasty in young patients. *J Bone Joint Surg (Br)* 1993; 75: 616-23.
- Keener J D, Callaghan J J, Goetz D D, Pederson D R, Sullivan P M, Johnston R C. Twenty-five-year results after Charnley total hip arthroplasty in patients less than fifty years old: a concise follow-up of a previous report. *J Bone Joint Surg (Am)* 2003; 85: 1066-72.
- Kim Y H, Oh S H, Kim J S. Primary total hip arthroplasty with a second-generation cementless total hip prosthesis in patients younger than fifty years of age. *J Bone Joint Surg (Am)* 2003; 85: 109-14.
- Kobayashi S, Eftekhari N S, Terayama K, Joshi R P. Comparative study of total hip arthroplasty between younger and older patients. *Clin Orthop* 1997; (339): 140-51.
- Malchau H, Herberts P, Eisler T, Garellick G, Soderman P. The Swedish Total Hip Replacement Register. *J Bone Joint Surg (Am) (Suppl 2)* 2002; 84: 2-20.
- McAuley J P, Szuszczewicz E S, Young A, Engh C A. Total hip arthroplasty in patients under 50 years and younger. *Clin Orthop* 2004; (418): 119-25.
- McLaughlin J R, Lee K R. Total hip arthroplasty in young patients. 8 to 13 -year results using an uncemented stem. *Clin Orthop* 2000; (373): 153-63.
- National Institute for Clinical Excellence (NICE). Guidance on the Selection of prostheses for primary total hip replacement. London 2003.
- Sochart D H, Porter M L. The long-term results of Charnley low-friction arthroplasty in young patients who have congenital dislocation, degenerative osteoarthritis, or rheumatoid arthritis. *J Bone Joint Surg (Am)* 1997a; 79: 1599-617.
- Sochart D H, Porter M L. Long-term results of total hip replacement in young patients who had ankylosing spondylitis. Eighteen to thirty-year results with survivorship analysis. *J Bone Joint Surg (Am)* 1997b; 79:1181-9.
- Sochart D H, Porter M L. Total hip arthroplasty with cement in patients less than twenty years old. Long-term results. *J Bone Joint Surg (Am)* 1998; 80: 1397-8.
- Sullivan PM, MacKenzie JR, Callaghan JJ, Johnston RC. Total hip arthroplasty with cement in patients who are less than fifty years old. A sixteen to twenty-two-year follow-up study. *J Bone Joint Surg (Am)* 1994; 76: 863-9.